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to the subject of which I have just been speaking. Some few proper motions had been observed by earlier astronomers, but when Herschel took up the subject proper motion had not been accurately measured in any case.

If a man is walking through a wood the trees in front of him seem to be opening out before him, whilst those behind seem to be closing together. In the same way if our sun is moving relatively to the center of gravity of all the stars, the stars must on the average seem to move away from the point towards which the sun is travelling, whilst they must close in towards its antipodes. These two points are called the apex and antapex of the sun's path.

Now Herschel concluded that there was something systematic in the proper motions of the stars, and that there was a point in the constellation of Hercules from which the stars were on an average receding, and that similarly they were closing in towards the antipodal point. The first of these is the sun's apex and the second the antapex. These conclusions were drawn from the motions of comparatively few stars, but the result has been confirmed subsequently from a large number. Moreover, we have now learned by means of the spectroscope that we are travelling towards Hercules at the rate of about sixteen miles a second.

During these last few years this grand discovery of Herschel's has gained a great extension at the hands of Kapteyn and of many others, and it has been proved that other systematic motions of the stars are discoverable. The time at my disposal will not permit me to pursue this subject further, but I may say that it now appears that if we could view the universe from the center of gravity of the stars of the Milky Way, we should see a current of stars coming from a definite direction of space and penetrating our system.

What a vista of discoveries do these ideas open up to the astronomer! Some centuries hence the sun's apex may have shifted, and we may perhaps learn that the solar system is describing the arc of some colossal orbit. The drift or current of stars may also have begun to change its direction, and our descendants may have begun to make guesses as to its future course and as to its meaning. But whatever developments the future may have in store, we should never forget that the foundation of these grand conceptions of the universe was laid by Herschel. Holden ends his "Life of Herschel" with words which may also serve as a fitting end to my lecture:

> As a practical astronomer he remains without an equal. In profound philosophy he has few superiors. By a kindly chance he can be claimed as the citizen of no one country. In very truth his is one of the few names which belong to all the world.

George H. Darwin

PAUL CASPAR FREER. AN APPRECIATION

It is only a little over a decade since America broke out of her chrysalis and took flight into the large world beyond the range of her time-honored coast lights and began to shake off a little of her provincialism. At her farthest outpost she was fortunate in having sent out many able men. Among those was Paul Caspar Freer, who for ten years has been the director of the Bureau of Science of the government of the Philippine Islands. He went there at a time when the kings and captains had not yet departed and before the shouting had entirely died away. His work was not to run down *ladrones* nor to lend a voice to the tumult incident to a period of reconstruction. He set to work, with little funds and no sympathy, save from a very few, to organize what has become to-day the leading scientific organization in the orient. The writer, who is proud of having served under Dr. Freer for six years, knows what he went through, in that time; of the bitter opposition

and criticism he had to stand, not only from some of the natives (they must be forgiven), but from many of his countrymen, who ought to have known better (which can be forgiven, but not so easily).

Dr. Freer brought to his work a superb training, M.D. at Rush Medical and Ph.D. at Munich, a large view of scientific problems and their practical bearing and an almost painful regard for accuracy and detail, which I sometimes think can be got only in the German schools. I think I am safe in saying that Dr. Freer read and read carefully (and some of us know how ruthlessly) every article on whatever subject which has appeared in the *Philippine Journal of Science,* through the six years of its existence. This is the thing he lived for, and I have had the satisfaction of knowing that this journal is highly regarded in Europe and that over there he was one of the best known of all Americans in the east. But not so in America, where, I regret to say, the ignorance of our own possessions is surprising.

When the man in the street, the "get-rich-quick" schemer and some of the politicians were striving to commercialize the work of the bureau and pressure was being brought to bear on the staff, in that time when ideals in our work seemed about to suffer, when we young and inexperienced ones were in danger of losing sight of the lasting results, the work that would tell, the tall gray-haired familiar figure would loom up in the doorway and then would ensue such a talk as only a big man, a real scientist, can give, and we would take heart again. Those were times of great inspiration to us, and now that his voice will no longer be heard in those halls, we must live on the memory of it. How soon everything becomes a memory!

The work of the bureau will continue, another hand will guide, may be in a larger way still, or in a smaller way; but we, the workers, at least will miss the master.

Dr. Freer had not been well for the last two years, and after returning from a trip with the Secretary of the Interior, the Honorable Dean C. Worcester, into northern Luzon, where he hoped to recuperate, died in Baguio, on April 18, at a little over fifty years of age.

WARREN D. SMITH

May, 1912

THE MASTER'S DEGREE AT RUTGERS COLLEGE

UPON unanimous recommendation of the faculty the trustees of Rutgers College at their recent meeting adopted the following report of the faculty committee on graduate degrees:

Your committee on graduate degrees submits for the consideration of the faculty and for its action the following principles and consequent changes of policy in the granting of the master's degree, and recommends their adoption:

Two principles stand foremost: first, the master's degree should be given a distinct and definite place among academic honors; secondly, the degree should be held in the esteem due a higher degree. Those colleges and universities which grant it to graduate students only after at least one year's residence have thereby tried to restore it to honor, but they have failed to give it a distinct place, for it is usually merely a preliminary step towards the doctor's degree, to be forgotten if that degree is won, or to be a consolation to those who fail. In short, the course of study, the method of study and the aim of the student, all make it a doctor's degree of an inferior type; and as such it is often a reproach to the student in later years if it remains his final higher degree. On the other hand, those universities and colleges which grant it *in absentia* or after the completion of courses in medicine, law or divinity are either making it still less honorable or are making it a second degree for precisely the same work and both superfluous and meaningless. This is felt so generally to-day among able and right-minded students that few are willing to seek the degree under these latter conditions.

To the small college belongs especially, we believe, the task of rehabilitating this degree. Few small colleges are in a position to give adequate courses and facilities of research to candidates for the doctor's degree and it is often their duty to urge such students to go elsewhere; whereas, in the case of the master's degree, provided this degree is rehabilitated properly, the small college may be able to offer excellent opportunities to the student, to do so without great cost to the treasury